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Ferroelectricity Newsletter

A quarterly update on what's happening in the field of ferroelectricity

Volume 9, Number 3

Summer 2001

HIGHLIGHTING *FeRAM* TECHNOLOGY

As mentioned in the previous issue, we devote the major part of this newsletter to one major conference, the **13th International Symposium on Integrated Ferroelectrics (ISIF 2001)**, held in Colorado Springs, Colorado, on 11-14 March 2001.

The growing maturity of ferroelectric applications is an indication of the high activity in research and commercialization. For example, papers on *FeRAM*-based smart cards/tags and applications were a highlight of ISIF 2001. You will find the list of oral presentations on this subject on pages 3 and 4, the list of posters on page 10 of this issue.

In this connection, we would like to refer you to the upcoming **1st International Meeting on Ferroelectric Random Access Memories (FeRAM 2001)** to be held in Gotemba, Japan, on 19-21 November 2001. Please turn to page 23 for further information on this conference.

The **14th International Symposium on Integrated Ferroelectrics (ISIF 2002)** takes place in conjunction with two other international meetings dealing with the applications of ferroelectrics, the **International Symposium on the Applications of Ferroelectrics (ISAF XIII 2002)** and the **Meeting on Ferroelectric Materials and Their Applications (FMA XIX 2002)**.

These three conferences will take place simultaneously on 28 May – 1 June 2002 in Nara, Japan, under the title **International Joint Conference on the Applications of Ferroelectrics 2002 (IFFF 2002)**. For contact information, please see the Calendar of Events on page 24.

The second conference we cover in this issue is the **2nd Workshop on Ferroelectrics and FRAM Technology**, held in Yogin, Korea, on 11 November 2000. You will find a list of presentations, both oral and poster, on pages 17-20.

Rounding out the contents of this issue is a report on new publications of the Materials Research Society on pages 21-22.

Rudolf Panholzer
Editor-in-Chief

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Volume 9, Number 3
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Stacked $(\text{Bi},\text{La})_4\text{Ti}_3\text{O}_{12}$ (BLT) Capacitor for High Density Ferroelectric Random Access Memories

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Preparation and Characterization of Sol-Gel Derived $\text{Ba}_{0.8}\text{Sr}_{0.2}\text{TiO}_3$ Thin Films

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PGO Spin-Coating Precursor Synthesis

W.W. Zhuang, F. Zhang, J.-S. Maa, S. Teng Hsu

Effect of Bottom Electrodes on the Structural and Electrical Characteristics of Lanthanum Doped Lead Titanate Thin Films

S. Bhaskar, S.B. Majumder, P. S. Dobal, R.S. Katiyar, S.B. Krupanidhi

Chemical Origin of Different Electrical and Morphological Qualities in CSD Derived PZT Thin Films

T. Schneller, R. Waser

Composition Control of Lead Zirconate Titanate Thin Films Using Mixed Solutions of PbTiO_3 and PbZrO_3

T. Iijima, G. He, H. Funakubo

PZT-Based Piezoelectric Composites via Sedimentation Technique

A.L. Kholkin, P. de la Cruz, M. Avdeev, A. Wu, P.M. Vilarinho, J.L. Baptista, V.K. Yarmarkin

$(\text{Pb}_{1-x}\text{Ba}_x)\text{TiO}_3$ Thin Films Prepared by Liquid Delivery MOCVD: Influence of Process Parameters on Film Formation and Electrical Properties

S. Ritter, P. Schäfer, S. Hoffmann-Eifert, R. Waser

Novel Advanced Vaporization System Based on New Concept and Analysis of Reaction Process for SBT-MOCVD

M. Toda, K. Shishido, T. Takahashi, M. Kusuhashi, M. Umeda, M. Fukagawa, Y. Kanno

Influence of Substrate on MOCVD Growth of $\text{PbZr}_x\text{Ti}_{1-x}\text{O}_3$ Thin Films

M. Moret, M.A.C. Devillers, S.M. Misat, S.A. Rössinger, P.R. Hageman, P.K. Larsen

Process Modeling of Flash Evaporation for MOCVD of Complex Oxide Films

A. Colibaba-Evulet, J. Cuchiaro, G.S. Tompa, J.D. Cuchiaro, G. Provost, G. Huebner, F.P. Gnadinger

Electrical Performance of Lead Zirconate Titanate (PZT) Complex Oxide Films from Rotating Disk Reactor Metal Organic Chemical Vapor Deposition

J. Cuchiaro, G.S. Tompa, J.D. Cuchiaro, G. Provost, G. Huebner, T.D. Hadnagy, T. Davenport

Low Temperature Deposition of $\text{Pb}(\text{Zr}_x\text{Ti}_{1-x})\text{O}_3$ Thin Films by LDS Metal-Organic Chemical Vapor Deposition.

S. Jeong, H.R. Kim, C.S. Hwang

Metal Organic Chemical Vapor Deposition of Ru Electrode for $(\text{Ba,Sr})\text{TiO}_3$ Capacitors

Y. Kim, S.-C. Ha, K.-C. Jeong, K. Hong, J.-S. Roh, H.K. Yoon

Properties of Pt and Ir Films by Liquid Source MOCVD in O_2 and H_2

J. Goswami, C.-G. Wang, T. Lawson, P. Majhi, A. Kirby, S.K. Dey

Low Temperature Preparation of $\text{SrBi}_2\text{Ta}_2\text{O}_9$ Thin Films by Liquid-Delivery Plasma-Enhanced Metalorganic Chemical Vapor Deposition

W.-C. Shin, K.-J. Choi, S.-I. Cho, C.-M. Park, S.-G. Yoon

CIRCUITS AND DEVICES

Analysis of 1T2C-Type Ferroelectric Memory Cell in Read-Out Operation

S. Ogasawara, S.-M. Yoon, H. Ishiwara

An Improved Behavioral Model of Ferroelectric Capacitor

T.-L. Ren, C.-X. Li, W.-Q. Zhang, J. Zhu, L.-T. Liu

Ferroelectric Linked Cell Device Physics

ISIF 2001 PAPERS

C.A. Paz de Araujo, L.D.
McMillan, Z. Chen, Y. Shimada,
Y. Kato, T. Otsuki

Advanced Simulation Tool for
FeRAM Design

Z. Chen, M. Lim, V. Joshi, Carlos
A. Paz de Araujo, L.D. McMillan

Circuit Simulation of Switch Device
Furnished with Gain Cell Combined
to FeRAM

S. Koyama, H. Nozawa

A Model for High Frequency C-V
Characteristics of Ferroelectric
Capacitors

N. Ogata, H. Ishiwarra

PIEZOELECTRIC PHENOMENA AND MEMS APPLICATIONS

Design of a Ferroelectric Cantilever
Applied in Integrated Microphone
and Microspeaker

T-L. Ren, L-T Zhang, L-T. Liu, Z-
J. Li

Design of a Ferroelectric Cantilever
Applied in Integrated Microphone
and Microspeaker

T-L. Ren, L-T Zhang, L-T. Liu, Z-
J. Li

Study on ZnO/SiO₃/Si Layered
SAW RF Filter

T.L. Ren, L. Yang, H-J. Zhao, L-
T. Liu

High Frequency Response of Bragg
Reflector Type Film Bulk Acoustic
Wave Resonators

J.H. Kim, S-H. Lee, J-H. Ahn

Acoustic Characterization of AlN
Thin Films and Bragg-Reflector

Layers Using a High Overtone
Bulk Acoustic Wave Resonator
S.H. Lee, J-K. Lee, J.H. Kim,
S-H. Kim, J-H. Kim, K.H. Yoon

Piezoelectric ZnO Thin Films in
High Frequency Filters
G. Kowach

On Piezoresponse of Constrained
Ferroelectric Films

A. Roytburd, G.S. Ganpule,
A. Stanishevsky, J. Melngailis,
E. Williams, R. Ramesh

Characterizations of PZT Thick
Films Using a New Sol-Gel
Solution

Y.K. Lee, C.J. Kim, J.K. Lee, I.
Yi, I. Chung, W.I. Lee

Electrical Properties of 3-Compo-
nent Piezoelectric Thick Films by
Screen Printing Method

T-S. Kim, H-J. Kim, Y-B. Kim,
D-J. Choi, C.I. Cheon

Electric and Longitudinal Piezo-
electric Properties of PZT(52/48)
Films as a Function of Thickness
Prepared by Diol Based Sol-Gel
Process

T.S. Kim, J-H. Lee, K-H. Yoon

Fabrication and Testing of a PZT
Thin Film High Pressure Sensor

E. Zakar, R. Polcawich, M.
Dubey, R. Piekarski, J. Conrad,
B. Piekarski, M. Hollis, D.
Wickenden, J. Champion, D.
Porter

Electrical Properties of PZT Thin
Films Prepared on Giant Grained
Platinum Electrodes

D-S. Lee, S-H. Kim, D-Y. Park,
H-J. Woo, J. Ha, E. Yoon

Low Temperature Deposition of
(Mn,Sb) Co-doped PZT Thin Film
on (La,Sr)CoO₃ Electrode Films on
Silica

N. Wu, A. Ignatiev, Y.Q. Wang,
N. J. Wu, Y.Q. Xu

Crystal Ion Slicing of Domain
Microengineered Electro-Optic
Devices on Lithium Niobate

D.A. Scrymgeour, V. Gopalan,
T.E. Haynes

Monitoring the Texture and Optical
Properties of Ferroelectric Multi-
layers on Amorphous Substrates

M. Maglione, A. Gueldry, P.
Sibillot

Pyroelectric Properties of Sol-Gel
PZT and MN-Doped PZT Thin
Films

Q. Zhang, R.W. Whatmore

MATERIALS PROCESSING AND HIGH FREQUENCY DEVICES

Power Handling Capability of
Ferroelectric Ba_{1-x}Sr_xTiO₃ Phase
Shifter

S-K. Han, S-J. Lee, W-J. Kim, S-
E. Moon, E-K. Kim, K-Y. Kang

Microwave Frequency Conversion
in Coplanar Waveguide on
Bilayered Substrate with
(Ba,Sr)TiO₃ Film

T. Samoilova, K.F. Astafiev

K/Ka-Band Phase Shifters Using
(Ba,Sr)TiO₃ Thin Films on Sap-
phire and Glass Substrates

B. Acikel, A.S. Nagra, T.
Taylor, P J. Hansen, J.S. Speck,
R.A. York

The Design of 2.6 GHz

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Phase Shifter on the Base of
(Ba,Sr)TiO₃ Ceramic Film
Varactors

*A. Kosyrev, V. Keis, O. Buslov,
A. Ivanov, T. Samoilova, O.
Soldatenkov, V. Loginov, A.
Tumarkin, L. Sengupta*

Ferroelectric Films at High Micro-
wave Power of Ka-Band Frequency

*A. Kosyrev, V. Keis, O. Buslov,
A. Ivanov, T. Samoilova, O.
Soldatenkov, V. Loginov, A.
Tumarkin, L. Sengupta*

Microwave Properties of Ferroelec-
tric Films and Microwave Devices
on their Base

*T. Rivkin, J. Alleman, J.D.
Perkins, P.A. Parilla, D.S.
Ginley, A. Kozayev, M.
Gaidukov, V. Keis, V. Osadchy,
T. Samoilova, O. Soldatenkov,
L.C. Sengupta, L.H. Chiu, X.
Zhang*

Properties of Tunable Filters with
Ferroelectric Capacitors

*O.G. Vendik, I.B. Vendik, V.V.
Pleskachev, M.A. Nikol'ski, M.L
Khazov*

Preparation and Properties of BSTO
Thick Films on Metal Substrates

*P. Petrov, K. Sarma, N.
McNalford*

A Comparison of MOCLD with
PLD Ba_xSr_{1-x}TiO₃ Thin Films on
LaAlO₃ for Tunable Microwave
Applications

*F. Van Keuls, C.H. Mueller, R.R.
Romanofsky, J.D. Warner, F.A.
Miranda, H. Jiang*

Electrical Properties of Magnetron
Sputtered Thin BSTO Films De-
pending on Deposition Conditions

*A. Tumarkin, A.B. Kozayev, S.V.
Razumov, M.M. Gaidukov, O.U.
Buslov, Y.W. Song, C-S. Park*

STO Ferroelectric Films for Micro-
wave Applications at Room Tem-
perature

*A. Tumarkin, V.E. Loginov, M.M.
Gaidukov, O.U. Buslov, A.M.
Prudan*

Comparison of Barium Zirconate
Titanate Bulks and Thick Films for
Tunable High Frequency Devices

*F. Zimmermann, W. Menesklou,
E. Ivers-Tiffée*

Dielectric Nonlinearity of Epitaxial
Ba_{0.6}Sr_{0.4}TiO₃ Thin Films

*B. Park, D.B. Jan, Q.X. Jia, Y.
Gim, P. Lu, X. Pan*

Dielectric Properties and Tunability
of BST and BZT Thick Films for

Microwave Applications

*M. Voigts, J. Xu, W. Menesklou,
E. Ivers-Tiffée, C. Weil, R.
Jakoby*

(Ba,Sr)TiO₃ Thin Films Used for
Integrated Series Capacitors

*F.I. Ayguavives, J-P. Maria, A.
Tombak, A. Mortazawi, A.I.
Kington, G.T. Stauff, C. Ragaglia,
J.F. Roeder, M. Brand*

Processing and Properties of Lead
Strontium Titanate Films for
Tunable High Frequency Devices

*J. Goswami, C-G. Wang, T.
Lawson, P. Majhi, A Kirby, S.K.
Dey*

Ferroelectric Na_{0.5}K_{0.5}NbO₃ Thin
Films on Single Crystal Oxide
Substrates

C-R. Cho, A. Grishin

Dielectric Properties and Schottky
Barriers in Silver Tantalate Niobate
Thin Film Capacitors

J-H. Koh, A. Grishin, B-M. Moon

Barium Strontium Titanate Thin
Films By RF Magnetron Sputtering
for Thin Film Varactor Technology

*T.R. Taylor, P.J. Hansen, J.S.
Speck, B. Acikel, A.S. Nagra,
R.A. York*

AMERICAN CHEMICAL SOCIETY SHORT COURSES

In cooperation with Virginia Tech, Blackburg, Virginia, the American Chemical Society offers the following short courses for polymer chemists and engineers:

- Applied Rheology and Polymer Processing
- Introduction to Polymeric Adhesives and Composites
- Polymer Chemistry: Principles and Practice
- Polymer Characterization: Thermal, Mechanical, and Structural
- Polymer Synthesis: Overview and Recent Developments

FRAM PAPERS

SECOND WORKSHOP ON FERROELECTRICS AND FRAM TECHNOLOGY

The 2nd Workshop on Ferroelectrics and FRAM Technology was held in Yongin, Korea, on November 11, 2000. This workshop was co-organized by the Institute of Electronics Engineers of Korea (IEEK) and by the Pioneering Research Center of System IC 2010, and financially co-sponsored by Samsung Electronics Co., Hyundai Electronics Co. and Ferroelectric Device Laboratory (NRL). The workshop had more than 170 attendees from universities, research centers, as well as semiconductor-business companies including Samsung, Hyundai (currently Hynix), Sunic System and Inostek. A total of 67 papers including two invited papers were presented; 17 and 50 papers were assigned for oral and poster presentations, respectively. Two invited papers were "Inter-Metal Dielectric Process for Double-Level Metallization of Ferroelectric Memory" and "Recent Progress in 1T1C FRAM" presented by Dr. S. K. Hong of Hyundai Electronics Co. and Dr. Kinam Kim of Samsung Electronics Co., respectively.

The scope of the workshop covered all aspects of the ferroelectric technology including material issues, device fabrication, novel characterization, and system integration. All papers were published in the Proceedings of Workshop on Ferroelectrics and FRAM Technology, which was distributed to all attendees. One of the main features of last year's workshop was the active participation of the students: A total of 110 students attended the workshop. This led us to believe that ferroelectric-related research in Korea has a very promising future. Furthermore, the workshop was useful for making personal contacts, which promotes the productive cooperation between attendees: Scientists and engineers had a chance to exchange their recent results in various areas.

The 3rd Workshop on Ferroelectrics and FRAM Technology will be held in Korea; a detailed schedule will be decided at the committee meeting. For further information about this year's workshop, please contact Professor Yonghan Roh, General Secretary, School of Electrical and Computer Engineering, Sungkyunkwan University, Suwon 440-746, Korea, phone: 82-31-290-7134; fax: 82-31-290-5819; e-mail: yhroh@skku.ac.kr

The following is a list of titles and authors of oral and poster contributions presented at the "Workshop on Ferroelectrics and FRAM Technology" held on Friday November 11, 2000, in Yongin, Korea.

DEVICES AND CHARACTERIZATION

Inter-Metal Dielectric Process for Double-Level Metallization of Ferroelectric Memory

S. K. Hong, S. H. Oh, S. W. Lee, C. G. Lee, C. W. Suh, E. Y. Kang, B. Yang, Y. M. Kang and N. S. Kang

The Study of Electrical Properties of SrBi₂Ta₂O₉ Thin Films Depends on the Deposition Temperature and the Substrate Orientation

S. E. Moon, E. K. Kim, S. J. Lee, S. K. Han, W. J. Kim, K. Y. Kang, B. S. Kang, T. W. Noh, S. I. Kwun, H. J. Joo, M. S. Jang, K. J. Han, J. K. Lee, J. G. Yoon and T. K. Song

Enhanced Retention Characteristics of Pb(Zr,Ti)O₃ Capacitor

Kyu-Mann Lee, H. G. An, Y. T. Lee, S. H. Joo, S. D. Nam, J. J. Lee, K. S. Park, M. S. Lee, S. O. Park and Y. W. Park

Study on the Physical and Electrical Properties of MOCVD PZT Deposited Using a Seed Layer

Youngsoo Park, Yongkyun Lee, Junkey Lee, Ilsub Chung, Jungsoo Yong and Eungjik Lee

Characterization of Polarization and Mobile Ion Density in NDRO-Type Memory

K. -H. Kim, Y. Kim, S. Jung, J. Kim, N. Lee and S. -H. Jung

Characteristics of MFSFET Devices with Fatigue Phenomena

G. Lee, S. Kang and Y. -S. Yoon

MATERIAL PREPARATIONS AND PROCESSES

Recent Progress in 1T1C FRAM

Kinam Kim

Thickness Dependence of Imprint Degradation for Ferroelectric SrBi₂Ta₂O₉ Thin Films

Keum Hwan Noh, Young Min Kang, Beelyong Yang, Choong Heui Chung, Seaung Suk Lee and Nam Soo Kang

Ferroelectric SrBi₂Ta₂O₉ Thin

FRAM PAPERS

Films by Liquid-Delivery
Metalorganic Chemical Vapor
Deposition using
 $\text{Sr}[\text{Ta}(\text{OEt})_5(\text{dmae})]_2$ and
 $\text{Bi}(\text{C}_6\text{H}_5)_3$

*Woong-Chul Shin, Kyu-Jeong
Choi, Chong-Man Park and
Soon-Gil Yoon*

Characteristics of Pt/
 $\text{Sr}_{0.8}\text{Bi}_{2.4}\text{Ta}_2\text{O}_9/\text{Ta}_2\text{O}_5/\text{Si}$
Structure and the Effect of a Ta_2O_5
Buffer Layer

*Hoon Sang Choi, Kun Sang
Park, Yong Tae Kim, Seong-Il
Kim and In-Hoon Choi*

Characterization of Ferroelectric
Thin Films Prepared by Liquid
Source Misted Chemical Deposi-
tion (LSMCD)

*Hyun Jin Chung, Suk Jin Chung
and Seong Ihl Woo*

Direct Liquid Injection
Metalorganic Chemical Vapor
Deposition (DLI-MOCVD) of
 $\text{Pb}(\text{Zr,Ti})\text{O}_3$ thin films

*Dae-Hwan Kim, Jeong Seok Na
and Shi-Woo Rhee*

THEORETICAL ANALYSIS AND FUNDAMENTAL PROPERTIES

The Roles of Hydrogen in SiO_2
capped $(\text{Ba,Sr})\text{RuO}_3/(\text{Ba,Sr})\text{TiO}_3/$
 $(\text{Ba,Sr})\text{RuO}_3$ Capacitor

*J. Park, D. Hong, J. Kang, Y.
Kim and D. Choi*

Raman Study of the Effects of
Hydrogen on PbTiO_3 Crystals

*H. J. Joo, S. H. Lee, M. K. Ryu,
T. K. Kim and M. S. Jang*

Giant Grain Growth of Platinum
Films for Ferroelectric Applications

*Dong-Su Lee, Seung-Hyun Kim,
Dong-Yeon Park, Hyun-Jung
Woo and Jowoong Ha*

Morphotropic Phase Boundaries in
Relaxor-based Ferroelectrics

Sang-Jin Ahn and Jong-Jean Kim

Growth and Ferroelectric Properties
of Highly Oriented

$\text{Bi}_{3.25}\text{La}_{0.75}\text{Ti}_3\text{O}_{12}$ Thin Films
Grown on $\text{Pt/Ti/SiO}_2/\text{Si}(100)$ by
Metal-Organic Solution Decomposi-
tion

*Uong Chon, Ki B. Kim, Gyu C.
Yi and Hyun M. Jang*

POSTERS

Control of Grain-Boundary Loca-
tion in Ferroelectric Thin Films

Jang-Sik Lee and Seung-Ki Joo

Fabrication and Characteristics of
Piezoelectric PZT Cantilever for
High Speed AFM

*Hyo-Jin Nam, Seong-Moon Cho,
Yongjoo Yee, Dong-chun Kim,
Jong-Uk Bu and Jaewan Hong*

A Study on Growth and Electrical
Characterization of $\text{Sr}_x\text{Bi}_y\text{Nb}_z\text{O}_9$
Thin Film by RF Sputtering

*Jin Shi Zhao, Hoon Sang Choi,
Yong Tae Kim, Kwan Lee and In-
Hoon Choi*

A Study on Growth and Electrical
Properties of $\text{Sr}_2(\text{Ta}_{1-x}\text{Nb}_x)_2\text{O}_7$
Thin Films by RF Sputtering

*Seung-Jin In, Hoon Sang Choi,
Kwan Lee and In-Hoon Choi*

Characteristics of Metal LiNbO_3 Si

for a Single Transistor FRAM

*Bum-Sik Jang Dong-Gun Lim
and Junsin Yi*

Application of Pt/RuO_2 Hybrid
Electrode to ECR-PECVD PZT
Capacitors for FRAM Devices

Hee-Chul Lee and Won-Jong Lee

Fabrication of PZT Thin Film
Utilizaing Sol-Gel for Ultra Low
Voltage Operation

*Yongkyun Lee, Junkey Lee,
Changjung Kim, Insook Yi and
Ilsub Chung*

High Density Plasma Etching of
Iridium Thin Film for Ferroelectric
Random Access Memory

*Dongkyu Lim, IlSub Chung and
Chee Won Jung*

Low Voltage Performance in $(\text{Pb}_{1-x}\text{La}_x)(\text{Zr}_{1-y}\text{Ti}_y)\text{O}_3$ Thin Films

*Seung-Hyun Kim, D -S. Lee, D. -
Y. Park, H. -J. Woo, and J. Ha*

Ferroelectric $\text{Sr}_2(\text{Nb,Ta})_2\text{O}_7$ Thin
Films Prepared by Chemical Solu-
tion Deposition

*Chang Young Kim, Chang Young
Koo, Dong Chan Woo and Hee
Young Lee*

Effect of Grain Size of $\text{Pb}(\text{La,Ti})\text{O}_3$
Thin Films Grown by Pulsed Laser
Deposition for Memory Device
Applications

*Chang Hoi Hur and Sang Yeol
Lee*

Effects of La Concentration in
 $\text{PLZT}(x/30/70)$ Thin Films

S. Kim, S. Kang and Y. -S. Yoon

Fabrication and Characterization of
 $\text{Pt/LiNbO}_3/\text{AlN/Si}(100)$ Structure
for MFISFET Application

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| FRAM PAPERS |
|--------------------|

*S. Jung, Y. Kim, N. Lee, J. Kim,
S. Jung and K. -H. Kim*

Low Temperature Formation of
Ferroelectric $\text{Sr}_{0.9}\text{Bi}_{2.1}\text{Ta}_{2}\text{O}_9$ and
 $\text{Sr}_{0.9}\text{Bi}_{2.1}(\text{Ta}_{0.9}\text{Nb}_{0.1})_2\text{O}_9$ Thin
Films by Sol-Gel Process

*Seok-Pyo Song, Bong-Kyun Sun
and Byong-Ho Kim*

The Study on Etching Characteris-
tics of SBT thin films in $\text{CF}_4/$
 $(\text{Ar}+\text{CF}_4)$ and $\text{CHF}_3/(\text{CHF}_3+\text{Ar})$
Plasma

*Dong-Pyo Kim and Chang-Il
Kim*

Dry Etching of YMnO_3 Thin Films
Using Inductively Coupled Cl_2/Ar
Plasma

*Byung-Jun Min, Chang-Il Kim
and Yong-Tae Kim*

Control of the Orientation and the
Electrical Properties of a SBT Thin
Film via Applying a Seed Layer

*J. H. Kim, Y. K. Kim and H. M.
Jang*

Deposition and Characterization of
 $\text{La}_2\text{Ti}_2\text{O}_7$ Thin Films for NDRO
FRAM

Y. Kim, J. Yang and H. Park

Effects of Excess Pb Concentration
in Buffer Layer on PZT Thin Films

J. Yang, Y. Kim and H. Park

Fatigue Characteristics of PZT Thin
Films Prepared by Low Thermal
Budget Process

*Dong-Gun Lim, Young Park,
Bum-Sik Jang, Sang-Il Moon,
Joon-Tae Song and Junsin Yi*

Electrical and Structural Character-
ization of Y_2O_3 Films as a Buffer
Layer for a MFIS Transistor

*Dong-Gun Lim, Bum-Sik Jang,
Sang-Il Moon and Junsin Yi*

Ferroelectric Thin Films of
Aurivillius-type Layered Oxides
Do Sung Sohn and Wan In Lee

A Study on the Dry Etching Charac-
teristics of PZT Films in Cl_2/CF_4
Inductively Coupled Plasma

Jin-Ki Jung and Won-Jong Lee

Preparation and Electrical Properties
of $\text{Pb}(\text{Sc}_{1/2}\text{Nb}_{1/2})\text{O}_3(40\%)-$
 $\text{PbTiO}_3(60\%)$ Thin Films

B. J. Kuh and W. K. Choo

Asymmetric Pulsed dc Sputtered
 AlN Thin Film for FBAR Applica-
tion

*Ju-Hyung Kim, Si-Hyung Lee,
Jeon-Kook Lee and Jin-Ho Ahn*

Characterization of YMnO_3 Thin
Films with Various Substrates

*Jehun Kim, Seunggu Kang,
Eungsoo Kim, Yootack Kim and
Kwangbo Shim*

Control of Ferroelectric Fatigue by
Changing Crystallographic Orienta-
tion in Pb-based Relaxor Ferroelec-
trics

*Jung-Kun Lee, JaeYun Yi,
HeeSang Suh and Kug-Sun Hong*

Preparation and Characterazation of
 YMnO_3 Ferroelectric Films for
MFM, MFS & MFISFET Applica-
tion

*Kwi Young Yun, Jeong Seong
Kim, Soon Gil Yoon, Chae Il
Cheon*

Characteristics of Ferroelectric
 $\text{Pb}(\text{Zr,Ti})\text{O}_3$ Thin Films Having Pt /
 PtO_x Electrode-Barriers

Kwang Bae Lee and Byung Roh

Rhee

Electrical Characteristics of
 $(\text{Bi}_{3.25}\text{La}_{0.75})\text{Ti}_3\text{O}_{12}$ Thin Films
for a Non-Volatile Memory Device
*Taek Jib Choi, Sungjin Jun,
Young Sung Kim and Jaichan
Lee*

The Effect of a Strain on the
Electricla Properties of an Epitaxial
 $(\text{Ba}_{0.5}\text{Sr}_{0.5})\text{TiO}_3$ Thin Films
Grown on Si

*Sungjin Jun, Young Sung Kim
and Jaichan Lee*

Electrical Characterizations of
 $\text{Ba}(\text{Zr}_{0.2}\text{Ti}_{0.8})\text{O}_3$ Thin Films
Grown Using a RF-Magnetron
Sputtering Technique

*W. Choi, B. Jang, J. Yi and B.
Hong*

Ferroelectric Bismuth Lanthanum
Titanate Films on Silicon by Pulse-
Injection Metalorganic Chemical
Vapor Deposition

*Joon Hyeong Kim, Doo Hyun
Choi and Hyeong Joon Kim*

FEM Analysis of Domain Evolution
in Epitaxial PbTiO_3 Thin Films

*Kilho Lee, Kyeong Seok Lee and
Sunggi Baik*

Defect Chemistry in CeO_2 -Doped
 BaTiO_3 Thin Films and Its Role on
the Suppression of Degradation

J. Hwang and Y. Han

Fatigue Properties and Photocon-
ductivity on Nb-doped $\text{Bi}_4\text{Ti}_3\text{O}_{12}$
thin films

*T. K. Kim, S. H. Lee, H. J. Joo, J.
P. Kim and M. S. Jang*

Effect of Excess Pb Concentration

FRAM PAPERS

and Ti Diffusion on the Growth of
PZT Thin Film by Sputtering

S. Ha, Y. Kim, H. Park, T. Kim

A Study of Self-patterned PZT
Films Grown by Adding NBAL

S. Ha, Y. Kim, H. Park, T. Kim

Effect of Solvent on the Properties
of PZT Thin Films Grown Using
Sol-gel Method

J. Jung, Y. Kim, H. Park, T. Kim

Ferroelectric Properties of MgO
Dispersed-Pb(Mg_{1/3}Nb_{2/3})O₃-
PbTiO₃ (90/10) Films

*Dongkyun Park, Jeon-Kook Lee,
Deok-Soo Cheong and Jong-
Wan Park*

Fabrication of BLT-X Sputtering
Target and Ferroelectric Properties
of BLT-X for FRAM

Moonhee Lee and Kiseong Lee

Ferroelectric Properties of
Pb(Zr,Ti)O₃ (50/50) Thin Film on
La_{0.5}Sr_{0.5}CoO₃ and Pt

Heterostructure Bottom Electrodes.

*K. V. Im, B. J. Kuh and W. K.
Choo*

La³⁺ Ion Doping Effects in Ferro-
electric SrBi₂Nb₂O₉ Ceramics

*T.K.Song, C.S.Youn, M.H.Kim
and S.S Kim*

Orientation and Ferroelectric
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*Chang Won Ahn, Sang Bo Bae,
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*Seong M. Cho, Hyun M. Jang
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*Tae-Yong Kim, Seong M. Cho
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*Joo Dong Park, Ji Woong Kim
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PUBLICATIONS

NEW PUBLICATIONS FROM THE MATERIALS RESEARCH SOCIETY (MRS)**MRS Expands Series on Si Front-End Processing**

Newly published by MRS, *Si Front-End Processing: Physics and Technology of Dopant-Defect Interactions II* continues the previous year's front-end proceedings theme by focusing on the formation of electrical junctions in the front-end processing of devices sized for the approaching end-of-the-roadmap. Volume 610 in the MRS Symposium Proceedings Series, the book contains 60 pages and 416 pages.

Materials scientists, silicon technologists and TCAD researchers come together here to share experimental results and physical models that describe phenomena which control the three-dimensional dopant profile. Highlights include a number of industrial papers that focus on future issues in device scaling and how they can be quantitatively linked with the requirements placed on dopant profile and junction formation. Emphasis is on shallow junction depth and high-concentration activation, as well as the extremely tight limits on junction abruptness. An excellent historical overview of the field of implant and annealing in silicon devices is also provided. Topics include: the challenges of device scaling; 2-D dopant characteristics; Si front-end processing; ion implantation and shallow junction technology; group III dopant diffusion and activation; carbon diffusion and interaction with point defects; group V diffusion and activation; vacancy-type defects – interaction and characterization; regrown amorphous layers; and structure and properties of point and extended defects.

Editors: Aditya Agarwal (Axcelis Technologies, Inc.), Lourdes Pelaz (University of Valladolid; Hong-Ha Vuong (Lucent Technologies), Paul Packan (Intel Corporation), and Masataka Kase (Fujitsu Limited).

ISBN: 1-55899-518-8; \$69.00 (MRS members). \$79.00 (U.S. list), \$91.00 (non-U.S. list).

This volume is also available electronically on the MRS website, with free access for all current MRS members.

MRS Publishes New Volume on Vapor Deposition

Vapor deposition is increasingly used to synthesize thin films and coatings that underpin numerous technologies from microelectronics to aircraft engines. As the structural and compositional complexity of the vapor-deposited materials increases, many new methods of vapor deposition have been developed. The design of these new processes and materials is increasingly founded upon a detailed scientific understanding of the atomic-scale mechanisms of growth. Today, the community is beginning to rely more heavily upon the use of models that link these mechanisms to the growth conditions. This new volume from MRS explores these interlinked issues and their applications in micro- and magnetoelectronics, hard coatings, photovoltaics, high- T_c thin films and the group-three nitrides. *New Methods, Mechanisms and Models of Vapor Deposition* is organized so that many of the new methods of vapor deposition are introduced first. This is followed by a series of papers on the mechanisms of vapor deposition including the use of *in situ* characterization techniques to observe them. The volume finishes with papers exploring the application of modeling techniques to simulate the growth of vapor-deposited structures. The use of *in situ* sensors to validate simulations is also widely covered.

Editors: Haydn N.G. Wadley (University of Virginia), George H. Gilmer (Lucent Technologies), and William G. Barker (ITN Energy Systems).

Volume 616 in the MRS Symposium Proceedings Series [IBNS: 1-55899-524-2] documents symposium proceedings from the 2000 Spring Meeting in San Francisco is available in hardcover for \$67.00 (MRS member), \$77.00 (U.S. list), and \$88.00 (non-U.S. list).

This volume is also available electronically on the MRS website, with free access for all current MRS members.

New MRS Volume Explores Evolution of Heteroepitaxial Semiconductor Thin Films

Just published by MRS, *Morphological and Compositional Evolution of Heteroepitaxial Semiconductor Thin Films* documents symposium proceedings from the Spring 2000 Meeting in San Francisco and contains 46 papers, 333 pages.

Strain has a tremendous effect on the morphology and composition of heteroepitaxial semiconductor thin films. Recent progress in strained island formation, and in the morphological and compositional instabilities induced by

PUBLICATIONS

heteroepitaxial stress, has led to new theoretical and experimental advances, as well as to promising materials for various optoelectronic applications. Leading research groups that are focusing on these and related problems come together here to survey the important advances and breaking news in the field. The volume centers around mechanics rather than materials, presenting papers in different semiconductor systems, including SiGe, III-V, nitrides, or II-VI semiconductors. Issues on growth, characterization, and modeling of morphological and compositional nonuniformities are also addressed, as are devices based on these spontaneous structures. Topics include: surface dynamics—atomistic processes; growth on patterned, high-index and vicinal substrates; quantum dots and wires; interdiffusion and segregation; band structure, electronic properties and devices; morphology and microstructure; and nitrides.

Editors: J. Mirecki Millunchick (University of Michigan), A.L. Barabási (University of Notre Dame), N.A. Modine (Sandia National Laboratories), and E.D. Jones (Sandia National Laboratories).

[ISBN: 1-55899-526-9] Volume 618 in the MRS Symposium Proceedings Series is available in hardcover for \$71.00 (MRS members), \$82.00 (U.S. list), and \$94.00 (non-U.S. list).

This volume is also available electronically on the MRS website, with free access for all current MRS members.

Oxide and Metal Epitaxy Examined in New Volume from MRS

Thin-film epitaxy is integral to many current and emerging technologies, and continued progress in solving critical issues is essential to the realization of new devices. This new volume from MRS, ***Recent Developments in Oxide and Metal Epitaxy: Theory and Experiment***, focuses on progress in solving fundamental issues in the epitaxial growth of metals and oxides. Presentations cover both fundamental studies and technological applications. Insights from both experiment, and modeling and simulation, are combined to facilitate cross fertilization of ideas and understanding. One highlight is the use of *in situ* characterization techniques for enhancing the efficiency of materials development. Thin-film research is often unavoidably empirical in nature. Techniques for minimizing the time spent exploring the complex parameter space in order to optimize growth and processing conditions are of particular value to the materials scientist. Among the techniques discussed are spectroscopic ellipsometry and ion scattering and recoil spectrometry, LEEM (low-energy electron microscopy), STM (scanning tunneling microscopy), TEM (transmission electron microscopy), and RHEED (reflection high-energy electron diffraction). Topics include: growth and dynamics of metal films; structure and oxidation of metal films and surfaces; *in situ* studies of oxide growth; and epitaxial growth of oxides.

Editors: Mark Yeadon (Institute of Materials Research and Engineering and The National University of Singapore), Shirley Chiang (University of California, Davis), Robin F.C. Farrow (IBM Almaden Research Center), James W. Evans (Iowa State University), and Orlando Auciello (Argonne National Laboratory).

Volume 619 from the MRS Symposium Proceedings Series [1-55899-527-7] documents symposium proceedings from the 2000 Spring MRS Spring Meeting in San Francisco and is available in hardcover for \$63.00 (MRS members), \$73.00 (U.S. list), and \$84.00 (non-U.S. list).

Gate Stack and Silicide Issues in Silicon Processing are Focus of New MRS Volume

The feature size of microelectronic devices is approaching the deep submicron regime. Process development and integration issues related to gate stack and silicide processing are key challenges. Gate leakage rises sharply due to direct tunneling. Power and reliability concerns are expected to limit the ultimate scaling of SiO₂-based insulators to about 1.5nm. Topics in ***Gate Stack and Silicide Issues in Silicon Processing*** include: high-k materials; novel gate insulators; novel gate structures; advanced gate dielectrics; integration issues in the FEOL; novel silicide processing; silicide formation mechanisms; shallow junctions and silicides; and epitaxial silicides.

Editors: L.A. Clevenger (IBM Corp.), S.A. Campbell (University of Minnesota), P.R. Besser (Advanced Micro Devices, Inc.), S.B. Herner (Matrix Semiconductor), and J. Kittl (Texas Instruments, Inc.). [1-55899-519-6]

Volume 611 in the MRS Symposium Proceedings Series is available in hardcover for \$67.00 (MRS members), \$77.00 (U.S. list), and \$88.00 (non-U.S. list).

UPCOMING MEETINGS

1st International Meeting on Ferroelectric Random Access Memories (FeRAM 2001)**19 – 21 November 2001****Keidanren Guest House, Gotemba, Japan****Scope**

FeRAM 2001, the first international meeting on ferroelectric random access memories, will be held on 19 – 21 November 2001 at Keidanren Guest House at Gotemba in the Shizuoka prefecture, Japan. Sponsored by the Research and Development Association for Future Electron Devices (FED), FeRAM focuses on materials, processes, devices, circuits and applications of ferroelectric random access memories. The meeting features active in-depth discussions. Distinguished scientists from all over the world will give lectures on the topics listed below. Contributed papers will be presented mostly in poster form. Authors of contributed papers will also be given a chance to make short oral presentations. Extended abstracts will be published and distributed to the participants at the conference. No on-site registration can be accepted.

Topics

- Materials and deposition techniques
- Modeling and theory for FeRAM materials
- Characterization
- FeRAM device integration and fabrication
- Devices and circuits
- Ferroelectric field effect devices
- Testing and reliability
- FeRAM-based applications

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CALENDAR OF EVENTS 2001

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| Aug 5-11 | • 8th International Conference on Ferroelectric Liquid Crystals (FLC 2001), Washington, D.C., USA (see <i>Ferroelectricity Newsletter</i> , Vol. 8, No. 3, p. 34) |
| Aug 12-16 | • 13th American Conference on Crystal Growth and Epitaxy, Burlington, Vermont, USA (see <i>Ferroelectricity Newsletter</i> , Vol. 9, No. 1, p. 26) |
| Sep 3-7 | • 10th International Meeting on Ferroelectricity (IMF-10), Madrid, Spain (see <i>Ferroelectricity Newsletter</i> , Vol. 8, No. 3, p. 35) |
| Nov.19-21 | • 1st International Meeting on Ferroelectric Random Access Memories (FeRAM 2001), Gotemba, Japan (see p. 23) |
| Nov 26-30 | • 2001 MRS Fall Meeting, Boston, Massachusetts, USA (see <i>Ferroelectricity Newsletter</i> , Vol. 9, No. 2, p.15) |
| Dec 3-6 | • “Advanced Materials for Novel Microwave Devices” at the 2001 Asia-Pacific Microwave Conference (APMC 2001), Taipei, Taiwan (see <i>Ferroelectricity Newsletter</i> , Vol. 9, No. 1, p. 27) |
| 2002 | |
| May 28- Jun 1 | • International Joint Conference on the Applications of Ferroelectrics 2002 (IFFF 2002), Nara, Japan International Symposium on the Applications of Ferroelectrics (ISAF XIII 2002) International Symposium on Integrated Ferroelectrics (ISIF XIV 2002) The meeting on Ferroelectric Materials and their Applications (FMA XIX 2002) Contact: Prof. Tadashi Shiosaki fma@ms.aist-nara.ac.jp; website: fma.aist-nara.ac.jp |